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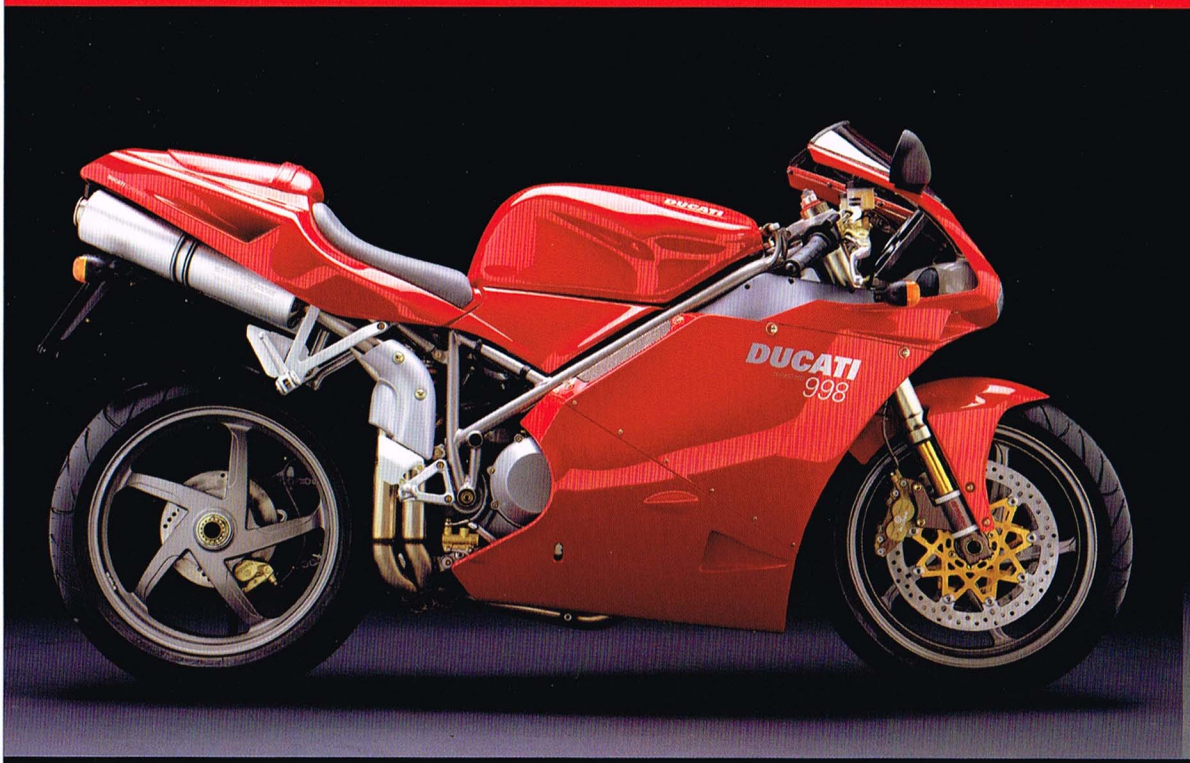
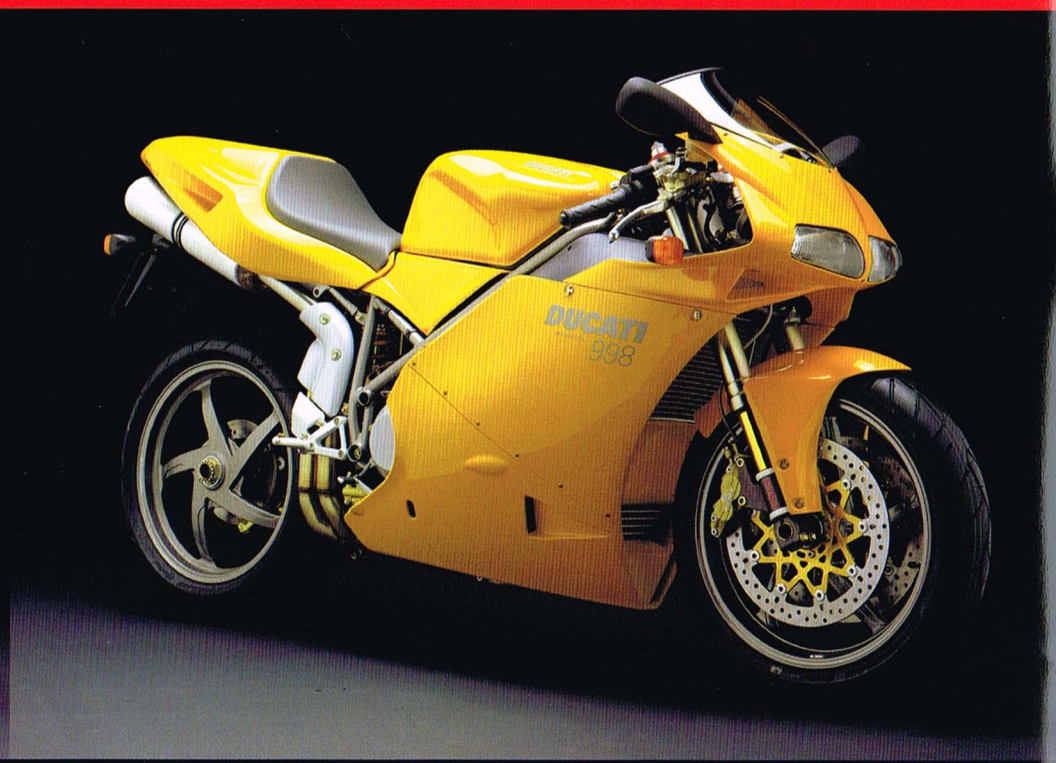




The Ducati 998 Testastretta – Race bike technology on the road

Ducati's Superbike family is perhaps the most famous in the world. With an unequalled record of victories and championships in World Superbike racing, the family evolves year on year, continuing at the top of the segment in terms of technology, performance and exclusivity.

Following the 2001 debut of the Testastretta engine in the 996R and the World Superbike championship winning machines of Ducati Corse, the new narrow head design engine is now widely available for the first time. Offering significantly more power than the outgoing Desmoquattro engines, the Testastretta is now available in three guises, in the form of 123hp 998, 136hp 998S and 139hp 998R.

The Ducati Superbike range continues to offer unsurpassed handling. Utilising the trademark Ducati trellis frame design, the 998 family excels by providing a truly confidence inspiring ride.

With fully adjustable Showa forks (Ohlins on the 998R) and an Ohlins rear shock absorber, it's easy to dial in suspension settings to suit individual riding styles whenever the need arises. The unique steering head angle adjustment facility fitted to the Ducati Superbike range provides another opportunity to 'fine tune' the handling of the 998.

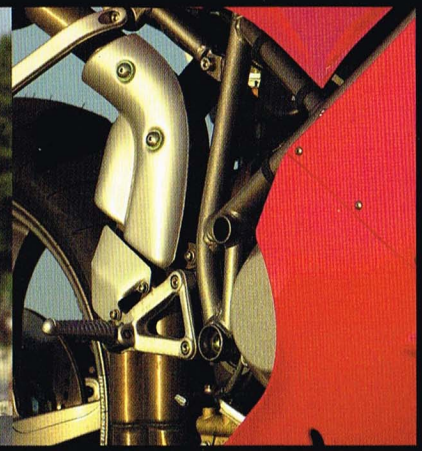
Resist its charms if you can...

Reproduced from Biker Magazine

It's early October, and autumn rain has arrived across much of Europe. But here at the Vallelunga racetrack outside Rome there's still a hot sun burning down from an unbroken blue sky. Weather included, this is one of those near-perfect days on which the job of a motorcycle journalist is every bit as good as it sounds. My task for the day is to thrash Ducati's new 998 around this excellent and nearly empty circuit, pausing only to make a few notes, rest my aching limbs and replenish spent energy at the lunchtime buffet.

Like the Roman summer, Ducati's eight-valve sportster seems to go on for ever. It's almost eight years now since the original 916 captivated the motorcycling world with its blend of stunning scarlet style, thunderous V-twin performance and impeccable handling. Since then, the 916 and its derivatives have sold in huge numbers worldwide, sparked a host of V-twin challengers and won a string of Superbike world titles, most recently via Troy Bayliss just a few weeks ago.

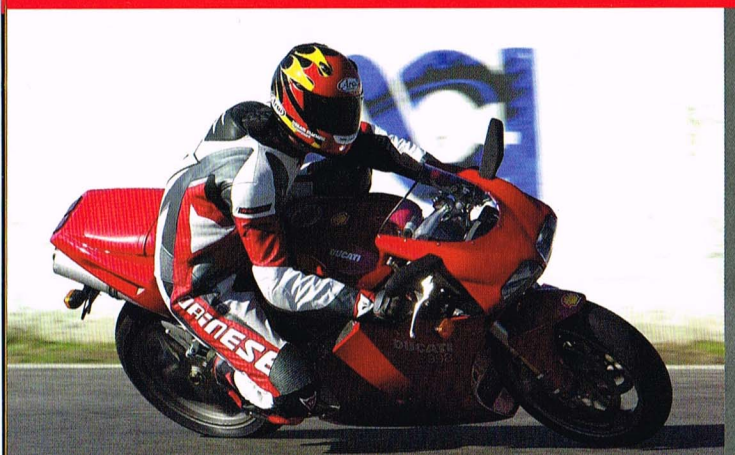
So it hardly seems possible that a new Ducati with essentially the same looks and engine format could make a remotely similar impact on a group of cynical journalists. Yet the Vallelunga pit garages are full of leather-clad riders with sweat on their brows and large smiles on their faces. Words such as "brilliant" and "fantastic" are on everyone's lips. One guy catches sight of a 998, sunlight bouncing off its curves in the pit lane, and remarks that it is utterly gorgeous, almost as though he's seeing that familiar shape for the first time.



He's right, though. The new 998 is a sensational bike, to look at as well as to ride, no matter how many of its eight-valve Ducati relations you've experienced in the last eight years. Massimo Tamburini's styling package has barely been changed in all that time, for very good reason. The dohc, liquid-cooled desmo engine and the chassis have been updated several times. But in producing this latest "standard" eight-valve model, powered by the new generation 998cc Testastretta (narrow head) V-twin motor introduced on this year's limited edition 996R, the Bologna firm has taken the biggest step since the 916 hit the streets in 1994.

Evidence for that claim comes with the simple statistic of the new bike's peak power figure of 123bhp at 9750rpm. This base model of the new three-bike 998 range produces a substantial 11bhp more than last year's equivalent 996, and delivers notably more torque at most engine revs. Its output matches that of the exotic, limited edition 916 SPS model of just four years ago. (This year's line-up also includes a hotted-up, 136bhp 998s, plus a limited-edition 998R flagship that produces 139bhp.)

The advantages of the Testastretta engine begin with the narrow valve angle - 25 degrees from the previous 996cc unit's 40mm - that gives the motor its name.



In conjunction with the flatter combustion chamber and larger valves (inlets from 36 to 40mm, exhausts 30 to 33mm) that this allows, the result is greatly improved airflow, especially above 6000rpm. The new motor also has steeper and shorter intake valve timing, as well as more oversquare dimensions of 100 x 63.5mm (from 98 x 66mm).

Other Testastretta changes include a larger airbox, plus a new fuel-injection system that has larger, 54mm (from 50mm) throttle bodies, and which positions each cylinder's single injector centrally, instead of to the side of the intake tract as before. The injection computer is a much smaller and lighter unit, as introduced on the 996R; other mods include an improved cam-belt tensioner system.

Chassis changes are less noteworthy, but even this basic 998 model gets seriously good equipment, while lacking a few of the more exotic components that help its siblings justify their higher prices. All three 2002 models employ the 996R-style frame whose wide-spaced top tubes allow the bigger airbox. They also all get a multi-adjustable Ohlins rear shock, though the standard and S model 998s make do with 43mm upside-down Showa front forks instead of the R model's Ohlins legs. That is not much of a hardship, and nor is this base-model Duke's uprated front brake spec of 320mm, 4.5mm thick Brembo discs (thinner than those of last year's 996) gripped by four-piston calipers, even if this bike doesn't follow the S and R models by getting the redesigned master cylinder from the 996R.

The standard bike's bodywork and airbox are made from plastic rather than carbon-fibre, too, but all three models have the subtly reshaped fairing introduced with the 996R.

Power Play

Almost immediately after firing up the 998 and heading down the pit lane, this promised to be one of those memorable days, like that of the 916 launch in Misano in early 1994. The circuit itself was one reason. Vallelunga's first chicane is one of the most wickedly challenging pieces of tarmac I've come across on any racetrack. It's approached blind, as it's over the brow of a slight hill at the end of the pit straight. Many such chicanes are too slow and fiddly to be fun, but not this second-gear complex, which is fast enough that it would be exciting even if it were not invisible until you were almost upon it.

Every lap it's much the same. Flashing across the start-finish line with my head held low behind the 998's short screen, I flick into fourth gear and wait, wait, wait before sitting up and squeezing the front brake lever at my marker to the left of the track. The Ducati's Brembos bite off speed fiercely as I flick down two gears in the superbly slick gearbox (I won't miss a change all day) and aim across the track from left to right, feeling the chassis twitch slightly as the tarmac drops away.

The 998 regains its poise rapidly, doubtless helped by the traditional transverse-mounted steering damper, as it regains some weight on its front wheel and the apex comes into view. My right knee-scraper brushes the ground just before I flick the bike left. I need no more than a gentle nudge of the handlebars to pick the 198kg twin from one side to the other.

Those super-responsive, titanium-nitride coated Showa forks are compressed by braking and a slight positive camber, which must be adding to the Ducati's agility. Despite this the 998 feels stunningly planted as it darts first left, then right as I tweak the bars yet again to send the bike carving its way out of the chicane. Ducati's are not regarded as the quickest-steering superbikes but the 998 is effortless, even though its adjustable headstock is set to the less steep, 24.5-degree fork angle.

There is huge potential for chassis tuning here, but the 998 is so good straight out of the box that the only change I've made (and will make all day) is to firm the front slightly with a turn of preload plus a couple of clicks of rebound damping.

Although I have had to move my body weight about during those two quick changes of direction, the superbly controlled Ohlins shock not only helps keep the bike stable, but gives superb feedback as the redesigned, 190-section Pirelli Dragon Evo Corsa bites into the track with impressive soft-compound stickiness. The dual-seat Biposto model's shock is perfect for my 14-stone weight on the track. But lighter riders, and those planning to ride only on the road, would probably be better off with the single-seat version, which has a slightly softer spring.

Now I'm hurtling out of the chicane, the Ducati's throttle open and the big V-twin motor pulling hard with a fruity bark that's as much intake as exhaust, as I pull my weight forward over the front wheel. The big V-twin has a distinct top-end edge on its 996 predecessor. Still cranked over in second gear, the bike builds revs so fast that it's a struggle to get my left boot under the gearlever in time to flick into third before hitting the limiter at 10,750rpm (which, a couple of times, it does, rather abruptly).

This circuit has no long straight to test top speed (in fact the top two gears aren't needed), but given enough space the 998 would surely be good for 170mph. What can be appreciated here is that the motor is magnificently torquey, too. The 998 rips forward from below 6000rpm out of the chicane (and from much lower than that out of the horribly tight first-gear hairpin), its injection system delivering the flawlessly precise, linear throttle response that is so helpful to fast riding.

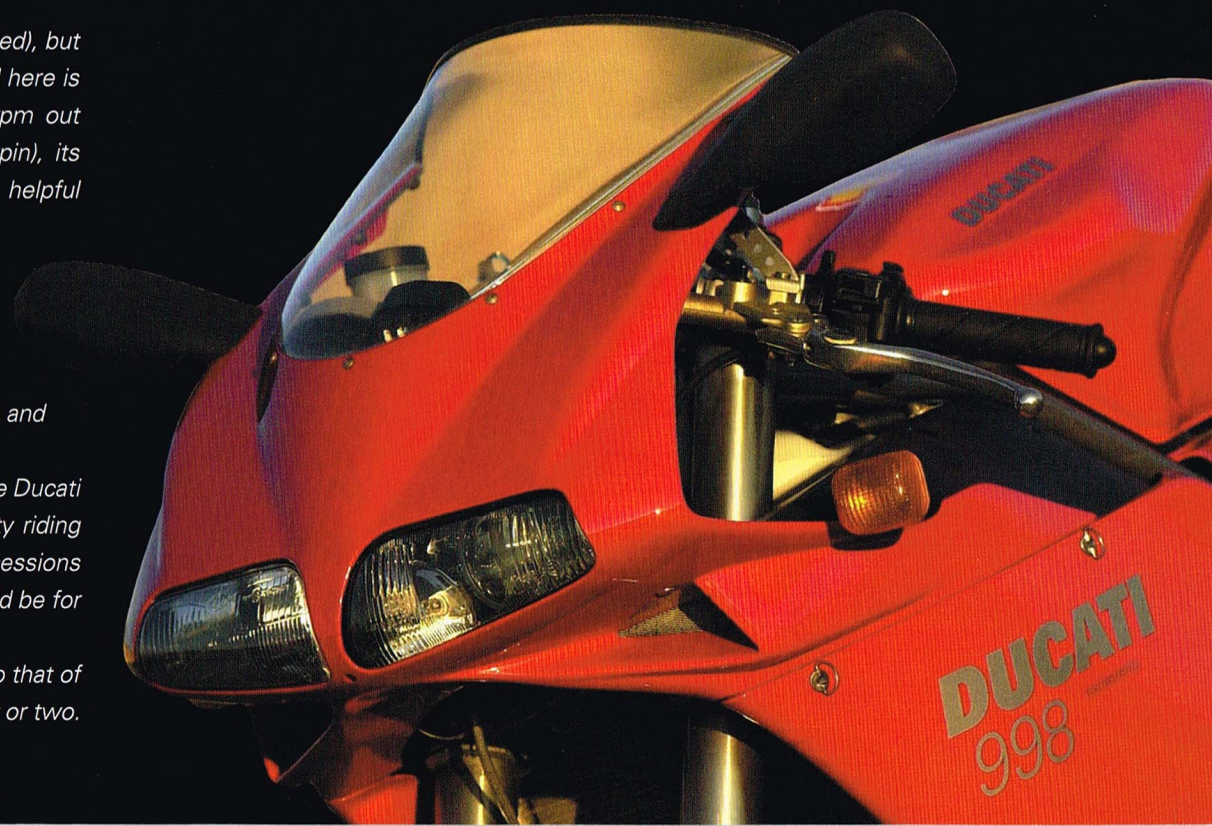
The years of roadgoing development and all those World Superbike titles are reflected in the way that the Ducati feels so refined and beautifully balanced, as well as fast. On top of all this the 998 is smooth, too, and there's a good reason for that. "A V-twin's secondary vibration is proportional to crankshaft radius divided by conrod length," explains R&D chief Andrea Forni, back in the pits. "The Testastretta has a smaller crankshaft radius and its conrod length is the same as the 996cc engine's, so vibration is reduced."

That smoothness will be welcome on the street, but don't think for one moment that the Ducati has gone soft. This is still a supremely focused, track-ready machine with an ultra-sporty riding position, a thin seat (especially for the Biposto's pillion), firm suspension and very few concessions to comfort in general and urban riding in particular. All of which is of course just as it should be for this latest successor to the mighty 916.

*One other thing that remains almost unchanged is the price, which will be very close to that of the current 996 Biposto, at around £11,000 on the road, in red or yellow and with one seat or two. The 998s, which produces 136bhp thanks mainly to hotter cam timing, will cost about £13,000; the limited-edition 998R, with oversquare engine dimensions (104 instead of 100mm bore) and higher compression, will be sold, probably via the Ducati.com web site in January, for £17,000.**

Those exotic models will be even faster on the track, but the standard eight-valver is now such a blinding motorbike that it's the one I'd spend my money on every time. We are now surely well into the autumn of the original Tamburini styled eight-valver's long life, with rumours growing stronger that it will finally be replaced by a more comprehensively redesigned flagship in a year's time. But just like that Roman sun, the Ducati continues to burn brighter than ever, matching its subtly improved chassis with the substantial power increase that makes the 998 a stunningly fast and rewarding machine.

** Actual recommended retail prices at time of going to press (December 2001) are 998 £10,450, 998s £13,150, 998R £17,700 on the road.*



Perfection Improved

Reproduced from Motorcycle Sport & Leisure, written by Kevin Ash:

Amazing stability, tons of mid-range torque, gorgeous looks, World Superbike domination, blah blah blah... another Ducati 916 derivative, another reshuffle of the same old adjectives. You know what's coming, so why read on?

Well, it IS true of course, but now set the regularity and consistency of Ducati superbike rave tests into the context of the time scale over which the bike has been available, and the fact that reports on this epochal machine STILL read the same as they did when it came out in 1994 is nothing short of miraculous. Yamaha's supersport offering at the Ducati's debut was the FZR1000 EXUP, for goodness' sake, a bike from another era - since then Yamaha has been through the Thunderace and is now offering its second take on the R1.

It's a fabulously fast moving world in which the Ducati has stood out partly for the completeness of its performance and partly because it barely seems to change when all around are frantically updating and improving.

It HAS changed though, but in a different way, evolving where others replace, enhancing rather than renewing. And judging by the new 998, Ducati is getting better and better at it - this latest incarnation of the classic is probably the most improved version yet.

The most confusing aspect is Ducati's nomenclature, so a brief explanation of exactly what this bike is first: for 2001 Ducati debuted its new Testastretta (compact head) engine in the 996R, the limited edition, very high spec machine aimed primarily at homologating the superbike race machines. This featured an entirely new cylinder head design with contemporary narrow valve angles rather than the old-fashioned 60 degrees between the valves on all the previous eight-valve Bologna twins and other 2001 996s.

For 2002, the standard version of the bike also features the Testastretta heads (and the host of other engine changes), as well as the capacity change from 996cc to 998cc. Yes, the 2001 996R was indeed 998cc, and guess what, the 2002 998R is actually 999cc...

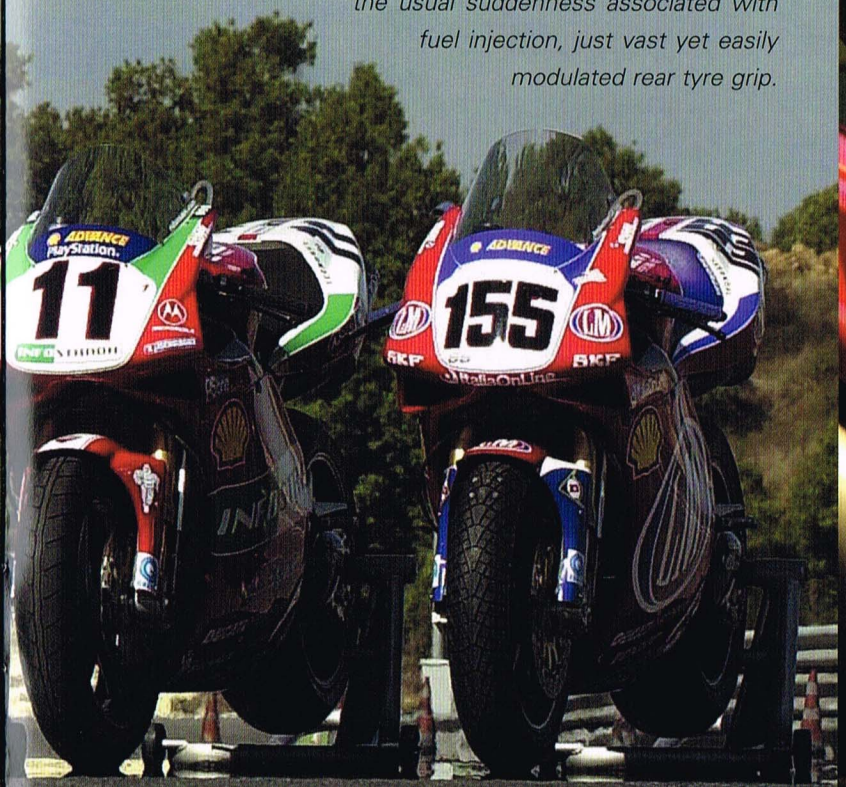
But the Biposto (twin seat) 998 tested here is a comforting 998cc.

There's no confusion when you open the throttle. Ducati is suggesting a peak power hike of 11bhp to 123bhp, and note that the company always quotes rear wheel figures rather than the Japanese preference for crankshaft power - convert the Italian numbers to Oriental ones and you're looking at least 135bhp, even 140bhp, especially as Ducati power claims are extraordinarily accurate. So the bike is breathtakingly fast with the motor spinning up to the 10,000rpm level and probably good for 170mph (Ducati speedos are deadly accurate, too - how times have changed...).

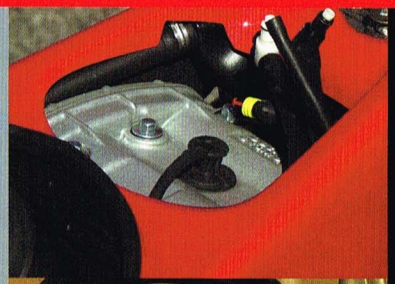
The Ducati 998 Testastretta – World Championship

But the most impressive gains are lower down, where the torque is so strong it repeatedly catches you out until you acclimatise to the thrust unleashed at the brush of the twistgrip. Yet, and it sounds contradictory, it's much more rideable than before - the response is so smooth and clean, the pick-up so predictable that the bike's around-town manners have been transformed. Aprilia's RSV Mille was streets ahead of the 996 in this one respect, but Ducati has hauled itself right back up there.

On the track - the bike was presented at the Vallelunga circuit, near Rome - it's substantially better too. The engine's controllability is a delight when powering out of a turn - none of the usual suddenness associated with fuel injection, just vast yet easily modulated rear tyre grip.



winning racing technology



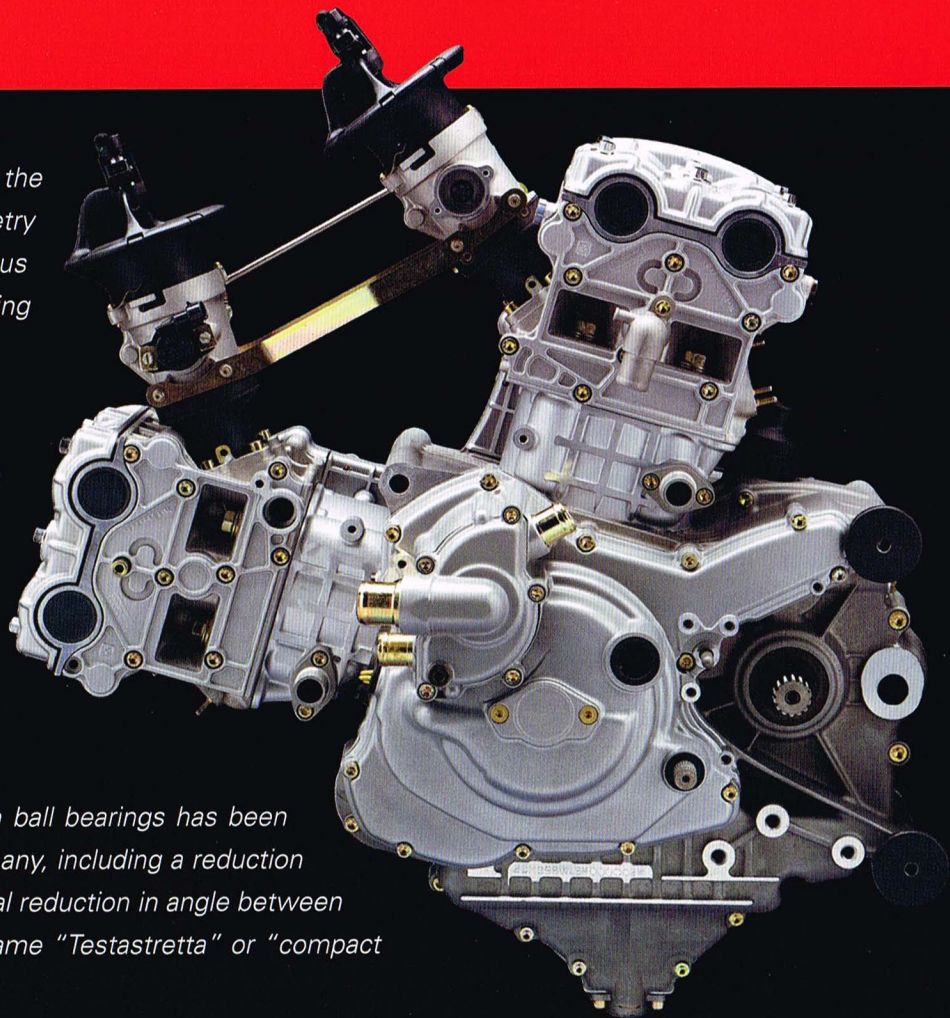
The spread of torque is huge, perfect for learning an unfamiliar track (or a virgin road) and for taming the power in the lower gears - let the revs drop to lower the horsepower, but still there's plenty to maintain the pace.

The 998 has lighter wheels and brakes than the 996, and the steering is noticeably sharper for that, but the legendary mid-corner stability is unchanged. Still this is a bike to sweep through turns rather than flick, but it gains through very high corner speeds rather than rapid changes of direction.

Visually there's little change, just as well on a machine which has starred in almost as many art galleries as race tracks. The fairing side vents are deleted (as on the 2001 996R) which only adds purity to the form, and that plus the discrete logo changes are about it.

But don't be deceived - the 998 is by far the best 916 yet. Whatever the capacity...

The Testastretta is the result of radical redesign of the most famous twin-cylinder engine in the world. It maintains its unique and fascinating engine architecture, but the internal geometry parameters and the thermodynamic configuration have been calculated, and numerous engineering details perfected. While remaining strictly faithful to its predecessors on a styling level, the testastretta is a brand-new engine, which replaces the superb 996cc Desmoquattro.



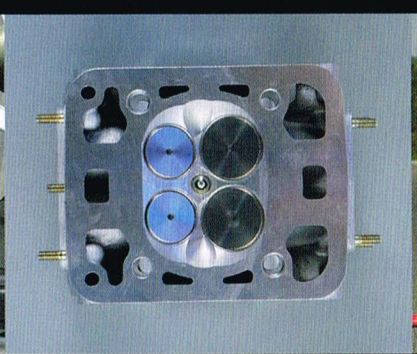
Testastretta Technology

Technically, the "Testastretta" is an all new 90° L-twin powerplant. The design starts with a completely new cylinder head, big bang, short stroke design and further innovations that extend to the very heart of the motor, the crankshaft. The design goal was clear: increase total power, boost engine revolutions, simplify mechanicals, lower engine temperatures, raise reliability and lighten weight. The solutions utilise all of our racing experience and express the peak of Ducati "know-how".

A Technical Brief

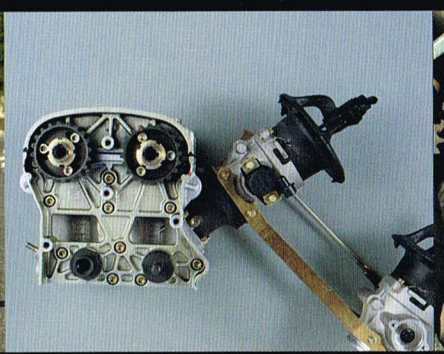
Starting with the cylinder heads: the conventional method of supporting the camshafts with ball bearings has been replaced with oil pressurised plain bearings. The advantages of the desmodromic motor are many, including a reduction in the number of moving parts which increases reliability and also reduces weight. A substantial reduction in angle between the intake and exhaust valve from 40 to 25 degrees is the design element from which the name "Testastretta" or "compact head" is taken.

Fully adjustable Ohlins rear suspension unit



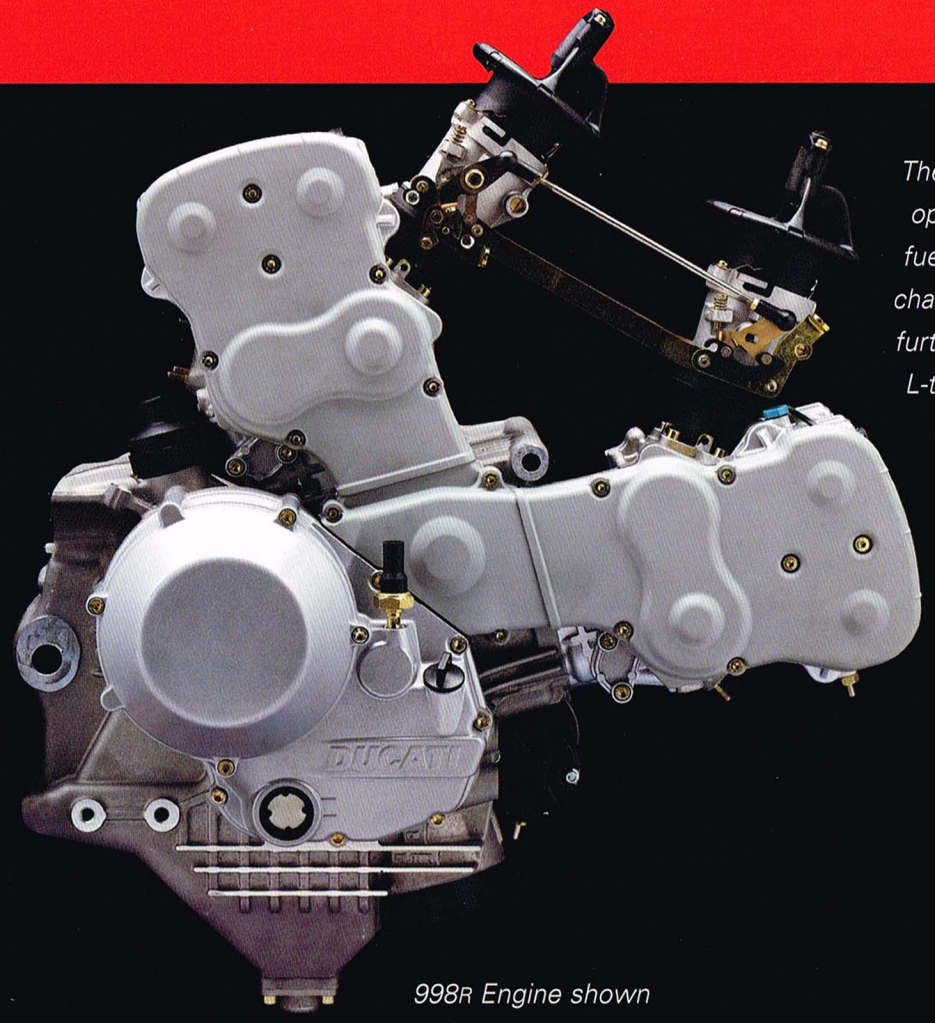
42mm exhaust valves with compact head design

Integrated engine-chassis design



Testastretta cylinder head

Compact 5.9 ECU system

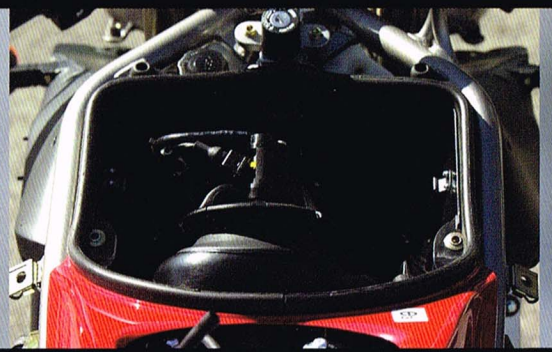


998R Engine shown

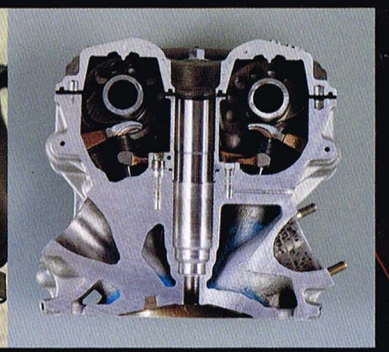
The more compact design has many advantages. It allows more room for larger valves, a more optimal shape to a smaller high compression combustion chamber which results in more complete fuel combustion and more power. Contributing significantly to the engines new high-rev limit is the change to the bore and stroke relationship. Ducati has pushed the "big bore/short stroke" formula further than ever before. Uniquely Ducati - the liquid-cooled, four-valve, fuel-injected Desmodromic 90° L-twin "Testastretta" engine - the pinnacle of Superbike power.

998	**Engine**	998cc L Twin cylinder, 4 valve per cylinder Desmodromic, liquid cooled
	Power	123BHP @ 9500rpm
	Torque	101 Nm-10.3 Kgm @ 8000 rpm
	Front Suspension	Showa with TiN upside-down fully adjustable fork
	Rear Suspension	progressive linkage with adjustable Ohlins monoshock
	Colours	Red, Yellow
998S	**Engine**	998cc L Twin cylinder, 4 valve per cylinder Desmodromic, liquid cooled
	Power	136BHP @ 10000rpm
	Torque	101 Nm-10.3 Kgm @ 8000 rpm
	Front Suspension	Showa with TiN upside-down fully adjustable fork
	Rear Suspension	progressive linkage with adjustable Ohlins monoshock
	Colours	Red, Yellow
998R	**Engine**	999cc L Twin cylinder, 4 valve per cylinder Desmodromic, liquid cooled
	Power	139BHP @ 10000rpm
	Torque	105 Nm-10.7 Kgm @ 8000 rpm
	Front Suspension	Ohlins with TiN upside down fully adjustable front fork
	Rear Suspension	progressive linkage with adjustable Ohlins monoshock
	Colours	Red

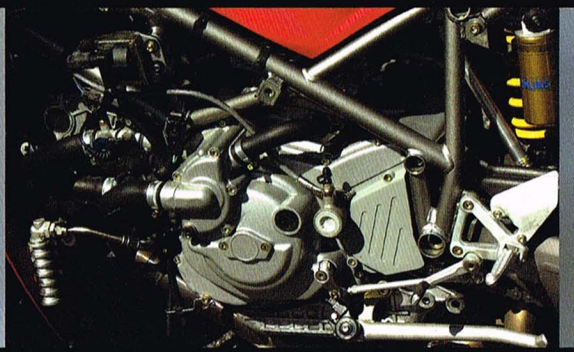
Lightened crank and con rods



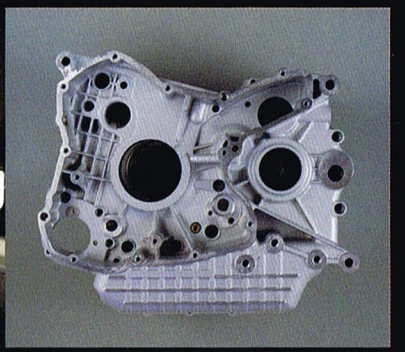
F1 Style fuel injection system



More compact desmo layout



Enhanced water pump



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